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Undergraduates are unique in that they are the first generation to have been completely immersed with modern technology and computers almost from their birth. Because members of the Net Generation have grown up with computers and increasing technological obsolescence, their methods for rating the usefulness of information is based on the speed and ease with which data can be accessed. This paper seeks to confirm that the Net Generation of students cares more about fast access to information then providing that information in ways that will be more then transitory. New methods are needed to work with this new generation of patrons who care more about technology, despite its limitations, then anything else at the library.

Headings:

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DIGITAL MEDIA AND THE NET GENERATION IN THE LIBRARY

by
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Table of Contents

Introduction **pg. 2**

Part I: Review of Relevant Literature **pg. 3**

The Net Generation **pg. 3**

Digital Preservation **pg. 8**

Part II: Thesis Statement **pg. 15**

Part III: Research Methodology **pg. 16**

Part IV: Research Findings **pg. 17**

Part V: Research Deductions **pg. 21**

Part VI: Conclusion **pg. 27**

Notes **pg. 29**

Appendix A: Questionnaire **pg. 31**

Appendix B: Tables **pg. 35**

Bibliography **pg. 41**

Introduction:

Over the last few decades, libraries have undergone a transformation as we have incorporated computers into the structure of the modern library. This revitalization has allowed libraries to accomplish many things that were never thought possible before. Yet now that computers have become a staple in libraries everywhere, the drawbacks of this digital pact have begun to show themselves. Librarians have slowly begun to realize that digital files are inherently fragile, unstable, and a preservationist's nightmare. However, there is one drawback that has not been truly addressed in the Information and Library Science Literature yet; the issues that are beginning to appear when dealing with the mindsets of the Net Generation. The Net Generation was born between 1982 and 1991, and it can be said that they are the first generation to truly grow up inundated with computers and digital information. This means that their knowledge base is completely different from preceding generations, so their assumptions on learning, studying, and preservation require librarians to have an entirely new plan of attack for teaching them. The modern librarian will face a battle on two fronts, that of finding a way to continue providing access to all their transitory digital information, while also meeting the demands of the upcoming generation of patrons. This paper will seek to first provide a proper background on the relevant literature concerning the Net Generation and then on digital preservation. The rest of the paper will be used to cover the thesis topic and for

analysis and discussion of the survey study conducted by the author with one hundred undergraduates at the University of North Carolina at Chapel Hill (UNC-CH).

Part I: Review of Relevant Literature

A short diatribe on the background of the current writers and famous works of both the Net Generation and Digital Preservation is necessary before delving into the research underlying this thesis. A modest discussion on the highpoints of both subjects will give the necessary knowledge base to fully appreciate the ramifications of the survey results.

The Net Generation:

Joan K. Lippincott has constructed one of the most important works on the Net Generation and their impact on libraries, in chapter thirteen of Educating the Net Generation. This chapter places the Net Generation as being born between 1982 and 1991[1], as this title and grouping truly captures the idea and age of the first students to grow up completely immersed in modern technology. This is also the age designation that was used to define the research survey. Lippincott describes Net Generation students as "having become accustomed to multimedia environments: figuring things out for themselves without consulting manuals; working in groups; and multi-tasking"[2]. While this sounds good on the surface, it also means that these students tend not to ask for help even when they require it, and would rather use methods for research that they already know rather then have to learn something new that works better. Net Generation students have grown so used to instant gratification from Google and the newest tech toys, that

they become easily frustrated with modern libraries when faced with a text based search program that they are unfamiliar with, or one that requires them to go elsewhere to receive their needed information, such as online journal databases without full text. One recent study mentioned in Lippincott's chapter showed that Google was the first choice for fifty-eight percent of students, no matter what the research they were undertaking, with only twenty-three percent using an index or database[3].

Caroline Geck, took her study even further into student's obsession with Google in, "The Generation Z Connection", which describes how students using Google are most likely to never look past the first page, as they automatically assume that any lower hits will not relate or that they merely have gotten their search terms wrong[4]. Essentially, if the sought after information cannot be found instantaneously, it becomes worthless. There is also the fear that these students are losing the ability to become deeply engaged in reading, since they prefer to scan everything they view for the highlights but not the deeper substance. So Net Generation students are likely to ignore elements of the "invisible Web or deep Web, such as dynamically generated Web pages" and commercial subscription databases as these either do not show up on search engines or require paid content. Since these students would prefer to have library and research resources available to them remotely, so they can multi-task at home, they are even less likely to seek the help of trained librarians to help train them in even proper electronic searches, let alone review paper sources.

The Christian Science Monitor summed up this problem quite nicely during the nineties with the headline "Spread of Technology Gives Rise to Culture of Immediacy", as Net Generation students view only the short term when considering how they want to

access and preserve their information for the future[5]. Stewart Brand has attempted to describe this problem with his book, The Clock of the Long Now: Time and Responsibility, which explains how humanity as a whole has a problem looking past its own current needs even a few months into the future, and computers have only made the situation worse by encouraging everyone to think in seconds rather then days. It was once a common assumption, and in some cases is still prevalent among the Net Generation, that digital files should last forever because nothing can harm information in electronic form. Andy Grove, head of Intel Corporation, even said, "Digital information is forever. It doesn't deteriorate and requires little in the way of material media"[6], and Milton Wolf discussed the belief that libraries of the future will simply be depositories of electrons, if they have any stock at all[7]. The reality is that the fragility of digital media shortens the average readability lifespan of any computer medium to an average of just five years, and yet the creation of born-digital content is estimated to nearly double every year[8]. This means that each year larger and larger amounts of the written thoughts of humanity vanish forever due to being trapped in unreachable media.

Net Generation students can also be said to have an even greater effect on the classroom with their digital focus then on libraries. Scott Carlson examines the struggle of the modern teacher in "The Net Generation Goes to College", describing Net Gen students as Millennials born between 1980 and 1994[9]. Essentially, the current era of teachers grew up learning with TVs and books, and now often make the mistake that the current generation are just younger versions of themselves, who must somehow be molded to be just like them. Students instead prefer to multi-task and try to teach themselves, and so are often seen as not paying attention, or viewed as the "attention

deficit generation"[10], simply because they have not grown up learning to place their entire focus on one thing at a time. Deborah Sheesley portrays this new method of learning as causing the Net Generation to be at odds with the Baby Boomer generation of teachers, who view them as "lazy and bored with a need to entertained"[11]. Many teachers have embraced PowerPoint to try and keep their classes attention, but this has lead to students skipping class and deciding to try and learn on their own just using the slideshow[12].

Don Tapscott also focuses on the impact of computers on the learning styles of the Net Generation in his writings, and is more liberal with his idea of the size of this generation of students, describing them as the Next generation, or N-Gen, with their ages running from 1977 to 1997[13]. He writes of how it is not uncommon for the modern student to continuously multitask, such as listening to music on an ipod, while chatting on instant messenger, using Google for a report and playing an online game such as *World of Warcraft*. Net Generation students dislike boring work, preferring to be entertained. They prefer to be actively involved in whatever they are doing, and strongly dislike being ignored. Thus, lectures during classes are now seen as a waste of time, with students losing interest if they are not allowed to speak every ten to fifteen minutes. A good description of this turn-around is that classes have gone from being teacher-centered to learner-centered[14], as active participation is seen as a must for the Net Gen student. Tapscott even discusses a study that shows that students with access to the newest forms of technology do significantly better in schools when compared with the digital have-nots without such access, making one question if such a need for digital learning might become a requirement for the classroom[15].

So with a lifetime of connection to computers, how are librarians to be expected to reach this first wave of the next generation of patrons? Jennifer Church believes a possible answer to the problems of the Net Generation is the inclusion of an information commons in Academic Libraries. These information commons typically combine the library's reference desk with the computer lab, and attempt to provide the largest body possible of digital books and journals along with knowledge specialists to teach students how to use them. Many libraries have found this to be a good pairing, as it places librarians directly among where the largest body of students has begun to congregate[16]. It is hoped that by having librarians on hand that they will be able to guide the students to better sources and teach them the fundamentals of learning to "move beyond Google".

However, Jill Morrison McKinstry focuses on the downsides to this solution, as librarians are often mistaken for computer technicians and asked questions on how to fix hardware problems for which they are not prepared[17]. This leads to frustrated users in the computer lab who grow angry at the sudden perceived disappearance of IT support. Students also are still not as likely to approach the reference librarians as one might prefer, due to their perchance for always attempting to muddle through problems on their own. UNC-CH found a good compromise is to include a librarian chat service through AOL instant messenger, as this is a medium undergraduates are used to and they feel more comfortable talking through. This has humorously led though to more then one case at UNC-CH where a librarian has discovered that the student they have been helping through IM is sitting less then fifteen feet away.

Digital Preservation:

Peter Lyman and Hal R. Varian discovered in 1999 that more than 90% of papers were born digital, meaning created electronically, that year, totaling 1.5 exabytes of storable content (10^{18} bytes) or 250 MB generated per person in the world[18]. Moreover, they found that the amount of printed media only made up .003% of the total, or 5 terabytes if converted to ACII format. A good example comes from the National Archives and Records Administration, who reported that in 1999 they were annually accepting 10 times more electronic records from the Treasury Department in email alone then they had received from the entire federal government in the previous 25 years[19].

This dependence on digital media for our thoughts, writings, and ideas is what has librarians worried about a possible forthcoming Digital Dark Age. The Digital Dark Age is described by Bryan Bergeron in his book, Dark Ages II: When the Digital Data Die, as the idea that the records of human knowledge for our era will go missing because of a lack of effort to preserve them. We are paradoxically both the most well documented period in our history as well as the worst documented, as most of the knowledge we generate hardly lasts any time at all[20]. The average person these days feels uneasy about damaging a book, but no compunction about deleting a file. The book has established value and so is protected, but the plethora of digital information that is lost or destroyed almost immediately due to carelessness is inexcusable. Even worse are the files that people try to protect, but become unreachable due to their owners waiting a few years before attempting to update them. These problems occur primarily due to technological obsolescence, which is defined as the problem that manufacturers today design their systems to be replaced within two to four years[21]. When home computers were originally

created, they were designed to last for decades of use, with all metal casings like other home appliances. Yet the manufacturers soon discovered that people were not keeping their computers anywhere near as long as they expected. Thanks to Moore's Law, that the number of circuits per unit of area doubles every eighteen months, computers become archaic within a few years of being created, so consumers have to keep buying new systems or be left behind.

Mark Stefik views technological obsolescence as the problem that when technology is programmed now the designers give precedence to higher connectivity and ease of searching information, with little regard towards backwards-compatibility for the programs that came before[22]. Stefik mentions a story from Egyptian mythology that when the God Thoth taught writing to Egyptians, Ra criticized him because he felt people would simply write things down and forget them[23]. This seems to fit our current situation, since writings on computers that are forgotten for any length of time become lost forever. Similarly, storage devices are designed to become obsolete with time, becoming easily damaged, wiped, or ignored by new technology. Three and a half inch diskettes are the newest medium to be left behind, as their disk readers are no longer available in new computers and libraries and patrons have a limited window to move these files to the next medium before they are considered permanently unreadable. This scramble to generate the next generation of technology has the Task Force on Archiving Digital Information describing the situation as:

> rapid changes in the means of recording information, in the formats for storage, and in the technologies for use threaten to render the life of digital information in the digital age as, to borrow a phrase from Hobbes, 'nasty, brutish, and short[24]

These digital loses can be seen by the rapid disappearance of html sites and links on the internet that have been recorded by Anne Kenny of Cornell University's Project Prism. They found that the average life expectancy of a web page is between 44 days and two years, and a significant proportion of those that survive undergo some change in content within a year[25]. Also, in a fairly consistent trend since 1998, Peter Botticelli has found that slightly over half (55-56%) the IP addresses identified in one year are still available the next. Within two years, a little over a third (35-37%) remains. After four years only one-forth of the IP addresses can be located that existed before. Even more disturbing is the number of official sites that are bought out by porn manufacturers, so that the uniform resource locator (URL) remains intact while the content changes drastically[26]. Considering that recent studies showed that libraries average thirty percent of their holdings in online media, due in large part to online periodicals, these statistics are especially worrying[27].

Sul Lee exposed the assumption that digitization is the answer to preservation, because critics using Moore's law as a basis touted that digital costs should fall 20-25% every year as memory becomes cheaper[28]. While Moore's law does relate that the price of circuitry should lower every eighteen months as better circuitry is introduced, it does not mean that the costs of digital archiving will lower as well. Due to the constant influx of new programs, hardware, and updates, librarians must be on constant vigil to ensure their programs continue to be able to interface with the current media. These continuous expenses prevent the projected lowering of costs mentioned previously. In fact, Diane Vogt-O'Connor reported in Cultural Resource Management (CRM) journal in 1999 that, “electronic records project experts have estimated that digital records are roughly 10-16

times more expensive to manage over time than paper records”[29]. It would require everyone to stop creating new programs and focus only on better circuitry for the original cost projection for libraries to be true.

So what choices do librarians have for digital preservation? Currently, our options are rather limited, as the movement of files from system to system can slowly corrupt or change the way the data is viewed. This slow movement of files can be achieved two ways, through either migration or emulation, each of which has its own problems. The Commission on Preservation and Access and the Research Libraries Group (CPA/RLG) report defines migration as, "...a set of organized tasks designed to achieve the periodic transfer of digital materials from one hardware/software configuration to another, or from one generation of computer technology to a subsequent generation"[30]. Rothenberg lists the following as the software's primary problems in relation to migration; labor intensive, time-consuming, expensive, error-prone, risky, non-scalable, and can require new solutions for each new format[31]. The goal of any migration program is reversible migration. Reversible migration merely means that if the migration process were reversed you would get the exact same data back that you started with, meaning that none of the data was lost or corrupted. While reversible migration is the final goal of any software, it is currently accepted that most migrations will lead to some kind of information loss.

Emulation, on the other hand, uses software to emulate obsolete systems on current systems, allowing them to, according to Margaret Hedstrom, "retrieve, display, and use digital documents with their original software"[32]. Three kinds of emulation exist; emulating applications, emulating operating systems, and emulating hardware

platforms[33]. These first two options can cause problems, though, with intellectual property rights, which is why Rothenberg advocates just emulating hardware. Emulation is considered to be a cheaper and better solution to migration, as there is little chance of data loss as it is the original information package being read, and once the platform is programmed it could read all of the associated packages. However, a number of problems still arise. Perfectly capturing a specific hardware platform with different speeds, colors, sound quality, etc can be quite difficult, especially when considering how many different configurations exist for each generation of equipment. Certain things such as old computer screens, joy sticks, and key boards cannot be emulated and can change the interaction with the program. So with emulation programs, it is not a question of capturing the entire program perfectly, but asking what is important enough to try and preserve correctly. As new technologies come out, the basic emulation programs will also have to be completely rewritten for these new systems.

Besides having a set schedule for updating all digital files every six months, the American Library Association's (ALA) plan for digital disasters recommends multiple servers, in off-site locations, with a regular timetable for all clients to make multiple backups of their work[34]. This ensures that even if one server is damaged or destroyed, other complete copies of everyone's work will still exist elsewhere. Metadata, a set of attributes used to describe an object, has recently come to the fore of any well protected database. Ensuring that routinely used and standardized metadata is used for all projects can help guarantee that all programs will have continual access and receive updates properly[35]. Overall the main concern is ensuring that the digital data is protected, and

that a corrupt-free version of each file will always be available to users. This is the end goal of any digital project.

Choosing what metadata to use can also prove to be problematic, as files that are popular now, such as portable document format (PDF) files, might not be so in the future. Libraries must take into account what other libraries are using for their digital projects, to allow for cooperative efforts, as well as considering what the largest swath of the populace will be able to access. Daniel Alemneh wrote that ensuring that routinely used and standardized metadata is used for all projects can help guarantee that all programs will have continual access and receive updates properly. This issue would be made much simpler if more users could be encouraged to use open-source code, as any problems in the source code are open for anyone to fix and the code can be recorded to allow replication by later generations if the original programs or computers are lost. However, the prevalence of the Windows platform at both home and in the library makes this increasing unlikely, as the source code is zealously kept under lock and key, and Microsoft has never made it a priority to provide proper backwards compatibility between current Windows programs and files from past operating systems.

The current recession that librarians have faced over the past few years has also not helped with dealing with materials that are so much more costly then traditional paper methods. G.E. Gorman is known for his writings on the troubles that librarians face when trying to guess what technology to purchase that will have the longest shelf-life. With Moore's law making computers out-dated after eighteen months of use, librarians can have a very hard time trying to decide if a new piece of technology is worth the risk when budgets are already stretched thin. For instance, the cheapest E-book reader on the

market currently is around three hundred dollars, but with the types of files for e-books constantly evolving there is no guarantee that the reader will work even a few years from now[36]. These purchases can be all the more tiring when faced with a public that has grown used to the newer is better mentality. Older computers are seen as a waste of space, and many patrons expect the library to be their access portal to new media when they cannot afford it themselves. To make matters harder for archivists, the Association of Research Libraries reported in 1991 that the ideal funding for any library's archives is four percent of the annual budget, and the average library does not even provide this much[37].

The largest attempt to teach the public about the problems of digital files was undertaken by the American Film Foundation on the ten year anniversary of their successful film, *Slow Fires*, by attempting a similar project with the film *Into the Future*. Yet while *Slow Fires* was a complete success, *Into the Future* flopped. The reasons behind this are many. First of all, while *Into the Future* described the problems taking place with digital files, it failed to offer any real plan for their preservation. Second, the imagery used in the film of old huge reels of magnetic tape from the National Aeronautics and Space Administration (NASA) could not connect with the audience. As the main line culture does not use this medium to protect its files, the example shown again and again in the film is written off as a unique case. It simply cannot compare with *Slow Fires* vision of rack after rack of decomposing books. Third, the scenes of old computers being broken apart and destroyed does not invoke the same feelings as a book being destroyed, because people today have become used to it. Since the new wave of computers comes out every eighteen months, and the new generation every five years, it

has become natural to go buy a new computer fairly regularly and throw out the old one. People do not care about their old computer systems, because they view their new ones as working better and faster. Fourth, the film was shown just as personal computers were beginning to really become a mandatory fixture of every home. As the internet became faster and programs became easier to use, more people began to use them personally.

Part II: Thesis Statement

What are the attitudes of the Net Generation towards the preservation challenges of digital media in the library? Based on the literature review it seems that members of the Net Generation, as a result of their lifetime immersion in computer facility, are unaware of and uninterested in these problems. Because members of the Net Generation have grown up with computers and increasing technological obsolescence, their methods for rating the usefulness of information will likely be based almost entirely on the speed and ease with which data can be accessed. Net Generation students can be expected to think that they are experts when using electronic research mediums, even though the opposite appears to be true. For this reason, the Net Generation will prefer libraries to have primarily digital media, such as electronic journals. Furthermore, their ideas regarding the costs, lifespan, and requirements of digital media are likely to be incorrect, making it even harder for librarians to communicate the difficulties of sustaining digital collections. The research should also demonstrate that even if a select few within the upcoming generation are aware of the drawbacks of archiving digital media, those few will not care and will still request those items above all others.

Part III: Research Methodology

In order to test the preconceived notions and mindsets of the Net Generation, a short survey of thirteen closed-ended questions was designed to be answered by some of the oldest members of the Net Generation, those students currently filling the ranks of the undergraduates at UNC-CH. One hundred surveys were sought to allow for enough data to show significance when entering in the data into the Windows statistical program, Statistical Package for the Social Sciences (SPSS). Survey questions related to student's library use, comfort level with search engines, use of various types of library materials, perceived costs of digital and paper materials, requirements of digital materials, lifespan of digital materials, size of the archiving budget, and feelings towards the size and use of the acquisitions budget for the library.

The first draft of the survey was completed and submitted to UNC-CH's Institutional Review Board council (IRB) on March 9th, 2006. Minor revisions were made at the IRB's request on March 21, and the survey was cleared for use on March 23, 2006. The survey can be viewed at the end of this paper in the Appendix A. Undergraduates were approached in the basement of the R.B. House Undergraduate Library by the author during the week of March 25-31, and asked if they would be willing to complete a short survey in exchange for a piece of candy. Solicitations ceased once one hundred viable surveys were acquired, as some initial surveys had to be discarded due to the undergraduates not fitting into the age range of the Net Generation. Surveys were only used from students aged eighteen to twenty two, as this range provides a clear picture of the common undergraduate in college today, while also placing the survey takers solidly in the age category of the Net Generation. The survey takers fell

into the following demographics; 36 men and 64 women filled out the survey; class ranks broke down to 28 freshmen, 22 sophomores, 22 juniors, and 28 seniors; with the ages of the interviewers being 15 eighteen yr. olds, 21 nineteen yr. olds, 27 twenty yr. olds, 24 twenty one yr. olds, and13 twenty-two yr. olds.

Part IV: Research Findings

This section is designed to list a summary of the data uncovered by the Undergraduate Survey, along with any SPSS data that shows whether the information is statistically significant or not. SPSS tables listing frequency of answers to particular questions that are footnoted in this section can be found in Appendix B: Tables. Questions will be reviewed in the order they originally appeared on the Undergraduate Survey, which can be viewed in Appendix A.

Question number one related to students library use, and offered eight multiple choice answers for students to describe the amount of time they spent in the library. As the central computer lab for undergraduates is located in the basement of the Undergraduate Library, it was expected that student's use of the library would be high. The data did demonstrate a slant towards higher use of the library, with seventy eight percent of those surveyed answering that they use the library at least once a week (B-1).

Question number two sought to identify the Net Generation's comfort levels when using online interfaces. Students rated themselves based on a scale of one to ten; with one representing a complete lack of knowledge and ten meaning they feel very comfortable using such interfaces. As we have assumed that the Net Generation should consider themselves highly adept at using online programs, it was no great surprise to

find that eighty six percent of those surveyed rated themselves as eight or higher on the scale, and that seventy three percent rated themselves as nine or higher (B-2). Thus it can be said that a clear majority of those surveyed at UNC-CH feel a clear comfort level when performing research online.

Question number three had students rate their personal use of various mediums in the library on a scale of one to ten, with one meaning they never use it and ten meaning they use it nearly every day. Students rated their personal use of Paper Books, Paper Journals, Electronic Books, Online Journals (Non-full text), Online Journals (full text), Microfilm, and Microfiche. The assumption of this question was that students would make the most use of electronic journals, due to fast access, with the other mediums becoming more ignored based on their degree of difficulty to retrieve. Overall, electronic journals, both non-full text and full text, showed to be the most popular resource, with only twenty-four to twenty-five percent saying they rarely or never use them (B-5, B-6). Paper books and journals were less popular, with forty-two and seventy percent, respectively, saying they rarely or never use them (B-3, B-4). E-books showed almost the exact same results as paper books, with forty-two percent saying they rarely or never use them. Microfilm and Microfiche were the least popular items for undergraduates, with ninety two percent and ninety five percent respectively saying they rarely or never use these items. This preference makes sense from an undergraduate perspective, as these items contain essentially the same types of information as online articles, but take much longer to access and search.

Questions four and five sought to discover if students really comprehend the differences in cost between the preservation of paper materials versus the costs of Digital

Media. Question four simply had students circle the choice they felt was cheaper to preserve, paper or digital media, while question five had them select from nine different percentages for how much cheaper they felt their choice was. The correct answer, according to CRM journal, is that Paper is ninety to ninety five percent cheaper then digital[38]. The hypothesis was that students would be biased to believe the opposite to be true, and this seems to be the case. Eighty two percent of those surveyed believed that digital materials are cheaper then paper materials, and of the other eighteen percent none guessed the extent of the true cost involved with preserving digital files. The only student to come close believed that paper materials were only seventy five percent cheaper to preserve. Ironically, five students did believe the opposite to be the case, with digital files being marked as ninety five percent cheaper then paper to preserve.

Questions six and seven asked students to decide between nine different percentages for how much of the library budget went towards paper books and journals and electronic books and journals, respectively, out of the 04-05 UNC-CH library budget. Currently, the UNC-CH library still spends about six times the amount on paper materials then digital, but I assumed students would either not comprehend this or desire the library to spend more. This appears to be the case, as students wrote that they believe the library spends only slightly more on paper works then digital works (B-7, B-8).

Question eight furthered these previous two questions by asking students how much they believe each group's budget increases each year. Students overall marked similar percentile increases to the budget for each group. Ironically, the digital budget actually decreased for the 04-05 school year for UNC-CH, as the previous year they made an agreement with Duke and NC State to seek a price break on electronic journals

from their publisher. Typically, this would not be the case, and the digital budget might be expected to increase more percentile wise then the paper budget.

Questions nine gave eight options for students to pick from, concerning how often they expected libraries should update their computer files. According to the ALA, the answer is that updates should be scheduled at least one every six months[39]. Students demonstrated a more conservative set of views, with only thirteen percent answering six months and seventy-eight percent answering that computers should be updated every three months or less. These answers meet with the author's expectations, as the student's high computer use means they should understand the need for ongoing updates of both computers and operating systems.

Question ten had two parts, asking students what they believed the average lifespan of digital documents to be with and without updates. Answers ranged all over the spectrum for the lifespan of digital documents with and without updates, with some students even believing that updating the data would actually shorten its lifespan (B-9, B-10). Thirteen percent of those surveyed even went so far as to say that digital documents would last forever so long as they received annual updates. So while a clear majority of students seem to understand that digital information is transitory, with the average digital lifespan answers being between one and twenty five years, it does not seem to affect their desire for the library to provide access to it.

Questions eleven and twelve sought to see if students would be willing to pay more for a larger acquisitions budget and if so what collections they would want the library to expand. Students who answered that the library had a sufficient budget had the option of marking whether they felt the budget was too large. While only one student

wrote that he felt the budget should be decreased, seventy two percent did write that they felt the budget was sufficient. However, this did not stop many of those students from marking in question twelve-b that they would prefer access to more full text electronic journals. While usage of full text and non-full text online articles showed to be about the same in question three, many students wrote comments on their surveys saying that the only increase in library acquisitions they would prefer would be for more full text online articles.

Finally, question thirteen sought to find what percentage of the libraries budget students felt should be put towards archiving. Archivists tend to agree that four percent of the total library budget should be sufficient for maintaining the library's collection[40]. Surprisingly, those surveyed tended to overestimate the amount the library should put towards archiving out of its total budget each year. Seventy eight percent of those surveyed agreed that the archiving budget should be between ten to fifty percent of the library's budget (B-11).

Part V: Research Deductions

When the survey was originally designed, its goal was to establish the bias of the Net Generation towards the ease of use doctrine for research, as well as trying to confirm their mistaken assumptions regarding digital preservation. In both areas the survey seems successful, as the data has shown to be almost entirely one sided in many of the instances. This section will provide further analysis of what the survey data means about the Net Generation and how they will impact libraries in the future. This examination will first inspect the desire of the Net Generation for digital access, and how this could impact

library budgets. The focus will then turn to the mistaken beliefs of the Net Generation regarding Digital Preservation, and how these assumptions can only serve as a barrier towards meeting a compromise towards building the library of the future with the new wave of future patrons.

The students surveyed demonstrated both a high enough library use to be deemed significant, and considered themselves overall to be adept at using online interfaces. Though the impact of the computer lab in the library might be said to bias the outcome of student's reported library use, the Net Generation's preference for computer media could expect them to use the majority of their library time online anyway. So, these results show those surveyed a good example of likely future patrons, and indicate that their faith in their technological abilities falls in line with that presupposed by the prevalent literature on the Net Generation. This means that their other reactions should all represent a common trend among the Net Generation of patrons.

The ease of access doctrine presupposes that those students who grew up in the Net Generation will base their values of information on how easy it is to access and retrieve, rather then seeking the most trusted and scholarly sources available for said information. This explains why Google is such a common first choice among Undergraduates, as it is a medium that can loosely be used on any subject and does not require learning a new knowledge base. The doctrine then explains why electronic journals are so popular, as they are the most versatile body of information available from the library. Online journals can be accessed from home, cut and pasted into reports, and easily downloaded into storage devices for ease of transportation and later access. E-books unfortunately do not have quite as much versatility, as publishers limit retention of

these items to restrict unwarranted copying and sharing of the books[41]. This might explain why E-books tied with regular books for the second level of popularity among the undergraduates surveyed. Both mediums contain a large amount of data, and have their own pros and cons when attempting to make use of their data for research. Paper books are easier on the eyes when reading long sections at a time, can be easily bookmarked for further study, and do not have a limit on their use set to only a few hours. E-books, on the other hand, can have their passages easily copied for papers, be searched by key-word, and can be easily accessed on readers such as palm pilots. The next level of use falls to paper journals, who might owe even this meager rating to the still high levels of non-full text entries in the online journal databases at UNC-CH. Students wrote many comments requesting the inclusion of a larger full text database in their library, and seemed to ensue that they would prefer it if there were no paper journals to have to deal with for their research at all. The incredibly low rate of use for both microform and microfiche is understandable based on the ease of use doctrine. With speed of information being a primary factor with the net generation, it is natural to assume that they would balk at going to the archives to use old film readers that can take hours of searching to provide any kind of results.

The survey taker's answers on what they believed the library spends on the acquisition of paper materials and digital materials similarly are enlightening; with most students feeling equal amounts were spent on each. This might be viewed to say that Undergraduates feel that their access to digital materials rivals that of their paper sources, but that theory falls apart when faced with the outcry in the surveys for an increase in the acquisition of online full text journals. Instead, this seems to represent the levels of

spending that the Net Generation would prefer for libraries, either equal or greater amounts set aside for digital files with a corollary decrease in the amount spent on paper materials, as most students seem to not be willing to merely increase the available acquisition budget. Librarians must decide how much of such an allowance we can allow with the fragility and temporary natures of digital files leaving them with a high cost and extremely brief shelf life for libraries in comparison to more tried and true storage mediums.

While attempting to decide the best course of action for teaching students the reasons behind a library's digital collection policy, the Net Generation's incorrect assumptions regarding digital media must also be faced. The mere fact that eighty two percent of those surveyed believed digital files to be cheaper to preserve then paper files, and that the other eighteen percent incorrectly guessed how much cheaper paper mediums are, should indicate the depth of the misplaced faith these students have in their digital files. While the survey takers did seem to understand overall that digital files are temporary at best, a large enough percentage, thirteen percent, did still believe in the inaccurate assumption that electronic data should last forever. With the first group, who understand that files are temporary, librarians must toil away at their ingrained acceptance with technological obsolescence, as libraries cannot afford to dedicate a large segment of their budget to files that they will simply have to buy again in five years time. This is a waste of money, and is deeply troubling to the archival belief that information should be preserved as long as it can for future generations. While a book can easily be ignored for a hundred years with little wear and tear, digital files are unlikely to last that long in any kind of readable format even with persistent effort the whole way. The

second group, who mistakenly place their belief in the incorruptible status of electronic data, must be actively targeted for transmission to them of the facts regarding digital fragility, both to help in engaging with their demands for library collections and to teach them the need to back up their own files and keep them updated.

Both of these groups could equally benefit from a modern version of the film *Into the Future.* The situations that caused the problems with the original when it was made back in 1997 have changed enough today to warrant giving a new version of the film a second chance. Home computers have gone from the slow moving Windows 95 to Windows XP, and you cannot turn around but to see computer advertisements. Also, digital has become the new buzz word, with digital cable, cameras, printers, and various other media flooding the market. It is possible that computers are building up into such a needed part of our everyday lives that the general populace might listen to a film if it were properly directed to them. A modern version of the film could include more personal interviews with everyday people who have lost personal files or programs located on old technology. Finding people should not be difficult, as everyone seems to have at least a few stories on this subject. Second, the visual imagery must involve something everyone can relate to, like old floppy and 3 1/2 inch diskettes. The latter would be especially useful as their technology has just been pulled from the market, and most people still have plenty of them sitting around, unreadable. Furthermore, since mediums become unusable after five years, the film can inform everyone that the CD-ROM is next, then the DVD, ad nauseum. The film will then need to delve into actual solutions that the populace can buy into. The forcing of companies to use open source code, such as Linux, would be a good start, as it allows computers to be more easily

customized and recovered later on. The pros and cons of emulation and migration can be touted, and can show the reemergence of old games on the internet to show that such data recovery is possible. An explanation will also be necessary of the process used to identify what data is critical and should be protected, and what can just be let go in terms of the average person. Most people do have quite a bit of junk on their computer, but there will always be certain files that people should learn to identify for protection before it is too late. Email would be a good example, as people are always deleting their inboxes without considering the consequences. Email has all but replaced the regular mail, and personal emails might warrant better consideration in the future then they have in the past. Lastly, the film can give more hope for the future by reminding the audience of the possibility that Moore's law will mean future computers will have space to record uncompressed files of the highest resolution, making it easier to preserve and migrate them without data loss. All these things working together might help create a film which could properly wake the average person as to their current situation.

The only data to come out of the survey that did not seem to fit properly with the assumptions of the Net Generation was the high percentages they attributed to the amount the library should put towards archiving. This overestimation can be considered one of two ways. It can be seen as just another example of the lack of knowledge the net generation has of the library, or it might show an unconscious acknowledgement of the upcoming costs that will be involved in attempting to continue providing contact to all of these digital files. Either way, it is clear that librarians have a long road ahead of them if they wish to shake this Net Generation of patrons free of their misconceptions.

Part VI: Conclusion

For these reasons, the Net Generation is poised to represent the greatest threat to school and academic libraries in the future, as their desire for increased access to digital media to solve their research requirements can only negatively affect already strapped recession era budgets. Libraries must carefully contemplate any reduction of areas of their acquisition budget in favor of freeing up funds for more digital access, as the money cannot stretch as far as it can with other mediums nor can the materials bought be expected to last any significant length of time. Student's lack of knowledge regarding the difficulties of digital preservation, and lack of concern for the transitory nature of the digital medium are a dangerous combination to libraries, as they merely represent the beginning of an ongoing trend. The Net Generation is especially problematic, as they seem to need help more then any preceding generation in learning to search for information, but they believe they need us less then ever before. These students are currently filling our academic libraries in undergraduate schools, but will soon be graduating and entering the work place. Librarians must persevere and develop new methods of reaching and informing this elusive group of patrons so that we will not be caught off guard when they become the majority of our users. With students demanding that more and more of the library's budget be put towards computers, we must seek some compromise to ensure that the information they desire will still be available more then a few decades into the future. Future studies might look into the best methods for relating the fragility of digital media to students, such as another Into the Future video, or simply looking into better methods of making contact with these students to teach them to look beyond their digital files, such as the creation of the information commons. Educating

the technological obsessed to look beyond back lit screens, while still maintaining library use levels, must become a focus of thought in the coming years, or libraries might simply develop into something as fragile and transitory as the digital files we are being asked to provide.

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Appendix A: Questionnaire

My name is Thomas Forsythe and I am conducting research in Information and Library Science. I am seeking information regarding undergraduate's attitudes and knowledge of library materials. If you have five minutes, please complete the survey, which has you answer a few short questions regarding the previously mentioned information. Those who complete the survey will receive a small candy bar for their efforts. Although this is not a library-sponsored survey, I have gotten their permission to conduct this survey in the library.

Your participation is voluntary, and you may skip any question you choose not to answer for any reason.

Your answers are completely anonymous.

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

I welcome you to contact me with any questions, comments or concerns that you have at stipanow@email.unc.edu. You may also contact my advisor, Paul Conway, at paul.conway@duke.edu.

Thank you very much for your participation!

How Much Do Undergraduates Know About the Library?

Thank you for taking the time to complete this survey. The aim of this survey is to gather data for an Information and Library Science Masters Paper, and will be testing your knowledge of the costs and requirements of various library materials. You will also be asked about how you personally make use of the library's materials, and which materials you prefer. This survey only takes a few minutes to complete. No personal information is taken on this survey, so your anonymity is assured.

Background Information:

1. Age: _____

2. Sex: M / F
(circle one)

3. Grade: Freshman , Sophomore , Junior , Senior
(circle one)

4. Current Major: _____
(If you have not chosen a major, write "undecided")

Library Service Questions:

1. How often do you use UNC's Libraries since the beginning of the Spring term? (circle one number)
   1 Less then once every six months
   2 Once every six months
   3 Once every few months
   4 Once a month
   5 Several times a month
   6 Once a week
   7 Several times a week
   8 At least five times a week

2. How comfortable do you feel using online interfaces, such as webpages and search engines? (circle one number)
   1 I do not know how to use these interfaces
   2 I am very uncomfortable using these interfaces
   3 I am uncomfortable using these interfaces
   4 I have limited experience with these interfaces
   5 I have some experience with these interfaces
   6 I have a general knowledge of these interfaces
   7 I can usually figure out how to use these interfaces
   8 I feel ok with these interfaces
   9 I feel comfortable using these interfaces
   10 I feel extremely comfortable using these interfaces

3. Please rate each of the following media based on your personal use in the campus library. (Rate on a scale of 1-10, with 1 being never and 10 being nearly every day)

____ Paper Books
____ Paper Journals
____ Electronic Books
____ Online Journals (Non-full text)
____ Online Journals (full text)
____ Microfilm
____ Microfiche

4. Which do you feel costs less for a library to preserve, according to CRM Journal (Cultural Resource Management); paper materials or digital media? (circle one)

Paper Materials Digital Media

5. How much cheaper do you feel your choice is? (Circle one number)

1. 1%
2. 5%
3. 7%
4. 10%
5. 30%
6. 50%
7. 60%
8. 75%
9. 95%

6. What percentage do you believe UNC's libraries spent for the 04-05 school year on paper books and journals out of their total budget? (Circle one number)

1. 1%
2. 5%
3. 7%
4. 10%
5. 30%
6. 50%
7. 60%
8. 75%
9. 95%

7. What percentage do you believe UNC's libraries spent for the 04-05 school year on electronic books and journals out of their total budget? (Circle one number)

1. 1%
2. 5%
3. 7%
4. 10%
5. 30%
6. 50%
7. 60%
8. 75%
9. 95%

8. How much do you believe these costs increase each year? (write in a percentage)

_____% Paper Materials _____% Digital Media

.9. How often do you believe the library needs to update its digital media, according to the Library of Congress? (Circle one number)

1. Every Day
2. Once a week
3. Once a month
4. Once every three months
5. Once every six months
6. Once a year
7. Only required when purchasing new computers
8. Never

10. What do you think the projected life span is for digital media with no updates, according to the findings of Cornell University? (For the purpose of this question, we are defining digital media as computer programs, e-books, and e-journals)

_____

10. What do you think the projected life span is for digital media with updates?

_____

11. Do you feel the library has a sufficient budget for acquisitions of new materials?

Yes (answer 12 A) No (Answer 12 B)

12 A. Do you feel the acquisition budget is too large?

Yes No

12 B. Where do you feel the budget should be increased? (put a check next to appropriate materials)

____ Paper Books
____ Paper Journals
____ Electronic Books
____ Online Journals (Non-full text)
____ Online Journals (full text)
____ Microfilm
____ Microfiche

13. What portion of the collection budget do you feel should be put towards archiving?

_____

Appendix B: Tables

1. **Libraryuse**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 once every six months	1	1.0	1.0	1.0
	3 once every few months	2	2.0	2.0	3.0
	4 once a month	5	5.0	5.0	8.0
	5 several times a month	14	14.0	14.0	22.0
	6 once a week	11	11.0	11.0	33.0
	7 several times a week	53	53.0	53.0	86.0
	8 at least five times a week	14	14.0	14.0	100.0
	Total	100	100.0	100.0	

2. **Techcomfort**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 I am very uncomfortable using those interfaces	2	2.0	2.0	2.0
	3 I am uncomfortable using those interfaces	1	1.0	1.0	3.0
	5 I have some experience using these interfaces	3	3.0	3.0	6.0
	6 I have a general knowledge of these interfaces	3	3.0	3.0	9.0
	7 I can usually figure out how to use these interfaces	5	5.0	5.0	14.0
	8 I feel ok with these interfaces	13	13.0	13.0	27.0
	9 I feel comfortable with these interfaces	40	40.0	40.0	67.0
	10 I feel extremely comfortable using these interfaces	33	33.0	33.0	100.0
	Total	100	100.0	100.0	

3. **Usepbooks**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	24	24.0	24.5	24.5
	2	18	18.0	18.4	42.9
	3	14	14.0	14.3	57.1
	4	8	8.0	8.2	65.3
	5	16	16.0	16.3	81.6
	6	5	5.0	5.1	86.7
	7	4	4.0	4.1	90.8
	8	5	5.0	5.1	95.9
	9	2	2.0	2.0	98.0
	10	2	2.0	2.0	100.0
	Total	98	98.0	100.0	

Missing	System	2	2.0		
Total		100	100.0		

4. **Usepjournal**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	49	49.0	50.0	50.0
	2	21	21.0	21.4	71.4
	3	9	9.0	9.2	80.6
	4	7	7.0	7.1	87.8
	5	3	3.0	3.1	90.8
	6	3	3.0	3.1	93.9
	7	4	4.0	4.1	98.0
	10	2	2.0	2.0	100.0
	Total	98	98.0	100.0	
Missing	System	2	2.0		
Total		100	100.0		

5. **Ejournno**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 I never use non-full text e-journals	15	15.0	15.3	15.3
	2 rarely use	10	10.0	10.2	25.5
	3 --	14	14.0	14.3	39.8
	4 --	9	9.0	9.2	49.0
	5 --	12	12.0	12.2	61.2
	6 --	13	13.0	13.3	74.5
	7 --	9	9.0	9.2	83.7
	8 --	12	12.0	12.2	95.9
	9 --	2	2.0	2.0	98.0
	10 I use non-full text e-journals every day	2	2.0	2.0	100.0
	Total	98	98.0	100.0	
Missing	System	2	2.0		
Total		100	100.0		

6. **Ejournfull**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 I never use full text e-journals	15	15.0	15.3	15.3
	2 rarely use	7	7.0	7.1	22.4
	3 --	9	9.0	9.2	31.6
	4 --	8	8.0	8.2	39.8
	5 --	13	13.0	13.3	53.1
	6 --	8	8.0	8.2	61.2
	7 --	17	17.0	17.3	78.6
	8 --	12	12.0	12.2	90.8
	9 --	5	5.0	5.1	95.9
	10 I use full text e-journals every day	4	4.0	4.1	100.0
	Total	98	98.0	100.0	
Missing	System	2	2.0		
Total		100	100.0		

7. **Paperbudget**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	2	2.0	2.0	2.0
	2	4	4.0	4.1	6.1
	3	6	6.0	6.1	12.2
	4	12	12.0	12.2	24.5
	5	35	35.0	35.7	60.2
	6	21	21.0	21.4	81.6
	7	15	15.0	15.3	96.9
	8	3	3.0	3.1	100.0
	Total	98	98.0	100.0	
Missing	System	2	2.0		
Total		100	100.0		

8. **Digitalbudget**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	4.0	4.1	4.1
	2	4	4.0	4.1	8.2
	3	7	7.0	7.1	15.3
	4	17	17.0	17.3	32.7
	5	36	36.0	36.7	69.4
	6	17	17.0	17.3	86.7
	7	11	11.0	11.2	98.0
	8	2	2.0	2.0	100.0
	Total	98	98.0	100.0	

Missing	System	2	2.0		
Total		100	100.0		

9. **Noupdates**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		13	13.0	13.0	13.0
	1 day	1	1.0	1.0	14.0
	1 month	3	3.0	3.0	17.0
	1 week	3	3.0	3.0	20.0
	1 yr	21	21.0	21.0	41.0
	10 yr	4	4.0	4.0	45.0
	100 yr	1	1.0	1.0	46.0
	15 yr	1	1.0	1.0	47.0
	18 month	2	2.0	2.0	49.0
	2 month	2	2.0	2.0	51.0
	2 yr	9	9.0	9.0	60.0
	20 yr	1	1.0	1.0	61.0
	3 months	1	1.0	1.0	62.0
	3 yr	5	5.0	5.0	67.0
	4 month	2	2.0	2.0	69.0
	4 yr	3	3.0	3.0	72.0
	5 month	1	1.0	1.0	73.0
	5 months	1	1.0	1.0	74.0
	5 yr	11	11.0	11.0	85.0
	6 month	9	9.0	9.0	94.0
	6 months	1	1.0	1.0	95.0
	6 yr	1	1.0	1.0	96.0
	7 yr	1	1.0	1.0	97.0
	8 month	1	1.0	1.0	98.0
	8 yr	1	1.0	1.0	99.0
	infinite	1	1.0	1.0	100.0
	Total	100	100.0	100.0	

10. **Updates**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		14	14.0	14.0	14.0
	1 day	1	1.0	1.0	15.0
	1 month	1	1.0	1.0	16.0
	1 week	1	1.0	1.0	17.0
	1 yr	8	8.0	8.0	25.0
	10 yr	13	13.0	13.0	38.0
	12 yr	1	1.0	1.0	39.0
	15 yr	1	1.0	1.0	40.0
	2 month	1	1.0	1.0	41.0
	2 yr	8	8.0	8.0	49.0
	20 yr	8	8.0	8.0	57.0
	25 yr	2	2.0	2.0	59.0
	3 month	2	2.0	2.0	61.0
	3 yr	6	6.0	6.0	67.0
	5 yr	11	11.0	11.0	78.0
	50 yr	5	5.0	5.0	83.0
	6 month	2	2.0	2.0	85.0
	8 month	1	1.0	1.0	86.0
	infinite	13	13.0	13.0	99.0
	yrs	1	1.0	1.0	100.0
	Total	100	100.0	100.0	

11. **Archiving**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	1.0	1.2	1.2
	3	1	1.0	1.2	2.5
	4	1	1.0	1.2	3.7
	5	6	6.0	7.4	11.1
	6	2	2.0	2.5	13.6
	7	5	5.0	6.2	19.8
	8	1	1.0	1.2	21.0
	10	15	15.0	18.5	39.5
	15	9	9.0	11.1	50.6
	18	1	1.0	1.2	51.9
	20	13	13.0	16.0	67.9
	25	4	4.0	4.9	72.8
	30	10	10.0	12.3	85.2
	35	1	1.0	1.2	86.4
	40	4	4.0	4.9	91.4
	45	1	1.0	1.2	92.6
	50	5	5.0	6.2	98.8
	65	1	1.0	1.2	100.0
	Total	81	81.0	100.0	
Missing	System	19	19.0		
Total		100	100.0		

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